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Editorial

Infants and toddlers must not be thought of as "miniature adults" – A forensic perspective

As with clinical paediatrics and hospital-based paediatric pathology, diseases and disorders of infants and toddlers that are encountered in forensic pathology are not simply miniature versions of the same conditions in adults. While injuries resulting from gunshots and sharp instruments may cause similar injuries and/or death at any age, there are a wide variety of other lethal conditions that are unique to infants and toddlers. Some, such as certain congenital cardiac, metabolic and neoplastic conditions[1,2] are well characterized, but rarely appear in adults. There are others, such as sudden infant death syndrome (SIDS) and sudden unexplained death in childhood (SUDC),[3–6] that await complete elucidation. Debate concerning the possible biomechanical basis of a variety of types of inflicted injury in infants, such as shaking, also continues. There is, however, little doubt that enhanced evaluation of the circumstances of death and postmortem examinations with extensive ancillary analyses, using increasingly sophisticated technological methods, will lead to the identification of as-yet unrecognized lethal diseases that are at present relegated to the category of "unclassified sudden infant death (USID)[3] or "undetermined." These and other issues have made the practice of paediatric forensic pathology and medicine a difficult one.[7]

Quite often papers appear in the paediatric literature with purported findings and mechanisms that are cited as 'diagnostic' or indicative of a particular disease, lethal mechanism, or condition. Studies that attempt to replicate these findings are of considerable value even if the findings in the initial research cannot be substantiated. For this reason several papers in the current issue have been selected despite having 'negative' results as these will help to clarify contentious issues.

The issue begins with a series of papers about SIDS and sudden infant death. Byard and Marshall's audit of fifty papers examining the use of SIDS definitions found that 58% of reports reviewed either did not specify a definition, or had used a non-standard one, thus severely compromising the interpretation of the proffered SIDS research. Clearly, if the findings in various studies from different groups of investigators are to be compared with one another, similar definitions for SIDS must be used, or at the very least the basis for case selection must be clarified, otherwise such comparisons will be difficult, if not meaningless.

A similar dilemma occurred with a series of papers by Naeye and colleagues during the 1980s in which they described the so-called "hypoxic tissue markers" for SIDS, including elevated fetal haemoglobin (HbF) levels, that they suggested were morphologic evidence of antemortem hypoxia and/or hypoxaemia.[8–10] Attempts to confirm these findings were plagued by a lack of standardized approaches to diagnosis, scene investigation, autopsy, and ancillary studies.[11] Krous et al. have addressed this issue with one proposed marker, by comparing HbF levels in a group of carefully-defined SIDS cases compared to controls using the San Diego SIDS definition[3] as a basis, with an optimal method for determining HbF levels, and standardized death scene and autopsy protocols. The results showed no differences in HbF levels between SIDS and control groups.

Differentiating SIDS from inflicted suffocation continues to present an important challenge to the paediatric forensic community, relying upon anatomic findings that are not often present[12] and/or confessions that are not surprisingly infrequently provided. Pulmonary intra-alveolar haemorrhage has been proposed as a potential marker to assist with this differentiation,[13,14] but again prior studies have lacked standardized approaches. In this issue, Krous and colleagues compared the severity of pulmonary intra-alveolar haemorrhage in well defined and matched groups of cases who died of either SIDS or accidental or inflicted suffocation and have determined that it cannot be used as a marker in isolation to distinguish between the two entities.

In a related paper Masoumi et al. report an infant with severe pulmonary siderosis and pulmonary intra-alveolar haemorrhage. Since a specific cause for the pulmonary pathology was not identified, the death was classified as USID,[3] after considering the possibility of a lethal variant of idiopathic pulmonary haemosiderosis.

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The remaining papers move away from sudden infant death towards other paediatric forensic issues. Byard begins this series by tabulating anomalies associated with Down syndrome and then analyzing possible mechanisms of death to assist in the forensic evaluation of these cases.

The abuse of children has been increasingly recognized during the last quarter of a century making it incumbent upon paediatric forensic pathologists to correctly understand the significance of findings that may indicate inflicted injury. This may come about through the study of living children, as demonstrated in the paper by Elder who has summarized the recent literature on the genital findings in living children and adolescents and then discussed the implications of these findings in the performance of the paediatric forensic autopsy. Her paper is followed by that of Goodyear-Smith who describes the evidence for non-sexual transmission of gonorrhoea after the neonatal period. She notes that while international consensus guidelines state that *Neisseria gonorrhoea* infection in pre-pubertal children is nearly always sexually transmitted, this is not supported by a systematic literature review which shows instead that *N. gonorrhoea* may be spread by communal baths, towels, fabrics, rectal thermometers, and caregivers' hands.

The final paper addresses the unfortunate fact that the court prosecutions may be confounded by conflicting and poorly-substantiated expert testimony by physicians.[15] In evaluating "confirmatory" medical opinion given to English courts, Pillai has identified a need for significant training among doctors undertaking examination of children suspected of being sexually abused.

Given the significance of a number of these topics and the potentially dire outcomes if cases are suboptimally handled,[16] one reason for having such a journal issue dedicated to these topics is in the hope that others will be stimulated to do work and research on paediatric issues, and so help to expand our knowledge and understanding of this vitally important branch of forensic pathology.

References

1. Byard RW. Sudden death in infancy, childhood and adolescence. 2nd ed. Cambridge: Cambridge University Press; 2004.
2. Krous HF, Chadwick AE, Isaacs Jr H. Tumors associated with sudden infant and childhood death. *Pediatr Dev Pathol* 2005;**8**:20–5.
3. Krous HF, Beckwith JB, Byard RW, et al. Sudden infant death syndrome and unclassified sudden infant deaths: a definitional and diagnostic approach. *Pediatrics* 2004;**114**:234–8.
4. Kinney HC, Armstrong DL, Chadwick AE, et al. Sudden death in toddlers associated with developmental abnormalities of the hippocampus: a report of five cases. *Pediatr Dev Pathol* 2007;**10**:208–23.
5. Paterson DS, Trachtenberg FL, Thompson EG, et al. Multiple serotonergic brainstem abnormalities in sudden infant death syndrome. *JAMA* 2006;**296**:2124–32.
6. Krous HF, Chadwick AE, Crandall L, Nadeau-Manning JM. Sudden unexpected death in childhood: a report of 50 cases. *Pediatr Dev Pathol* 2005;**8**:307–19.
7. Byard RW, Krous HF. Pediatric forensic pathology in crisis. *Pediatr Dev Pathol* 2004;**7**:212–3.
8. Naeye RL. Pulmonary arterial abnormalities in the sudden-infant-death syndrome. *N Engl J Med* 1973;**289**:1167–70.
9. Naeye RL. Brain-stem and adrenal abnormalities in the sudden-infant-death syndrome. *Am J Clin Pathol* 1976;**66**:526–30.
10. Naeye RL, Whalen P, Ryser M, Fisher R. Cardiac and other abnormalities in the sudden infant death syndrome. *Am J Pathol* 1976;**82**:1–8.
11. Beckwith J. *Chronic hypoxemia in the sudden infant death syndrome. A critical review of the data base*. New York: Academic Press; 1983.
12. Byard RW, Jensen L. Fatal asphyxial episodes in the very young – classification and diagnostic issues. Forensic Sci Med Pathol, in press.
13. Yukawa N, Carter N, Rutty G, Green MA. Intra-alveolar haemorrhage in sudden infant death syndrome: a cause for concern? *J Clin Pathol* 1999;**52**:581–7.
14. Becroft DM, Thompson JM, Mitchell EA. Nasal and intrapulmonary haemorrhage in sudden infant death syndrome. *Arch Dis Child* 2001;**85**:116–20.
15. Chadwick DL, Krous HF. Irresponsible testimony by medical experts in cases involving the physical abuse and neglect of children. *Child Maltreat* 1997;**2**:313–21.
16. Byard RW. Unexpected infant death: lessons from the Sally Clark case. *Med J Aust* 2004;**181**:52–4.

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